

Guy Dicharry, November 10, 2006

less (about 2.0% less) than yields available on tax-free municipal bonds, which has been the recent historical experience.

Loss of Enjoyment of Life/Value of Life

I have also been retained to provide testimony regarding loss of enjoyment of life damages in the wrongful death claim of the estate of Gabriel Lee. While I do not have an opinion concerning the specific dollar amount of loss of enjoyment of life for Gabriel Lee, I will provide testimony as assistance to the trier of fact concerning the specialized knowledge of economists regarding the value of a statistical life in the United States. As discussed in more detail below, the well accepted, peer-reviewed economic research on the value of a statistical life places a reasonable estimate of the value of an average life in the United States at \$5.0 to \$6.0 million in today's dollars.

New Mexico law allows monetary compensation for the loss of enjoyment of life or the value of life itself in personal injury (Isidro Sena v. New Mexico State Police, et. al.¹) and wrongful death (Romero v. Byers²) cases. The concept of loss of enjoyment of life or hedonic damages is premised on the assumption that the value of an individual's life exceeds the sum of that person's economic productivity, which includes his or her earning capacity and the value of household services. Loss of enjoyment of life damages consider the effect of the injury on the plaintiff's activities of daily living, leisure, hobbies, and recreational activities³, the ability to pursue a chosen occupation, and internal well-being.

In the Romero case the New Mexico Supreme Court held that the value of life is compensable under the Wrongful Death Act. In the Sena case the New Mexico Court of Appeals extended this precedent to personal injury tort actions involving permanent injuries. Furthermore, in Sena the court concluded that..."where an expert witness has been properly qualified, it is not improper for the trial court to permit an economist to testify regarding his or her opinion concerning the economic value of a plaintiff's loss of enjoyment of life." In Couch v. Astec Industries, Inc., et. al.⁴ the New Mexico Court of Appeals further defined the allowable contours of expert testimony on hedonic damages to include testimony on the economic research on the value of a statistical life as well as the broad areas of the human experience to be considered by the jury in determining such damages. I was the testifying economist in the Couch v. Astec Industries, Inc., et. al. case and have testified in at least fifteen other personal injury and wrongful death cases in state district court regarding the value of a statistical life.

¹ 119 N.M. 471,478, 892 P.2d 604, 611 (Ct. App. 1995).

² 117 N.M. 422,428,872 P.2d 840,846 (1994).

³ At a very basic level, the value of an individual's leisure activity may be valued at overtime and/or holiday wage rates, which are usually time and a half or double time. An employer must compensate an employee for the loss of leisure time, which occurs when a worker works overtime or on a holiday.

⁴ Tom Couch and Emily Couch v. Astec Industries, Inc., Southwest Crane, Inc., and Joseph Williams. In the Court of Appeals of the State of New Mexico, Docket No. 21,214, filed June 19, 2002. Cert. denied August 2, 2002. 2002 W.L. 184 0882.

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I have testified in the past three times in federal court in New Mexico regarding value of life. The cases were George Perez v. City of Hobbs⁵ before Judge Leroy Hansen; Contreras et. al. v. Roadrunner Trucking before Judge James Parker/Lyle Strom; and Rex Freeland v. USA⁶ before Judge Martha Vasquez. More recently in 2006, I have testified twice in federal court in New Mexico where I testified about the value of life studies, conducted by economists, and the results of these value of life studies in terms of the dollar value of a statistical life. One case was the Estate of Ethan Cayaditto v. USA before Judge John Conway and the other was the Estate of Kevin Boyer v. City of Albuquerque before Judge Judith Herrera.

I am aware of four other decisions in New Mexico federal courts where the judge has ruled on the admissibility of testimony by an economic expert regarding the value of a statistical life/loss of enjoyment of life. In McGuire v. City of Santa Fe⁷ Judge Black and in Wade Myers v. Williams Manufacturing Judge Johnson ruled that an economist could not testify. In Smith v. Ingersoll-Rand Co.⁸ the Tenth Circuit Court of Appeals held that it was proper under New Mexico law for the economic expert to explain his interpretation of the meaning of hedonic damages and to describe broad areas of human experience to be considered in determining such damages by the jury. However, the trial judge, Martha Vazquez, did not allow the economist to quantify in any way the loss of enjoyment of life. In Michael Cheromiah, et. al. v. United States of America⁹ Judge Vazquez did allow the economist to testify in this wrongful death case, where the economic testimony related to a *hypothetical* dollar value per year in loss of enjoyment of life (as a guideline) over the life expectancy of the deceased. In keeping with the latter Vazquez ruling,¹⁰ for Gabriel Lee have calculated, *as a guideline only*, the present value of *each* \$50,000 per year in loss of enjoyment of life as \$1,878,487 from the date of his death through his normal life expectancy. See Exhibit 4.

The purpose of my testimony regarding loss of enjoyment of life damages will be to provide an interpretation of the meaning of loss of enjoyment damages and to present the results from well accepted, peer-reviewed economic research on the dollar value of a statistical life. My testimony will assist the jury in its deliberation of the dollar value of the plaintiff's loss of enjoyment of life. It will be up to the jury to determine actual loss of enjoyment of life damages for the plaintiff in this case. Economists have expertise in the valuation of tangible goods and services such as earning capacity and household services as well as in the valuation of an intangible such as life itself. Lay persons do not have such specialized knowledge. Thus, a qualified economist by virtue of education, training, and experience can assist the jury in performing the unusual task of assigning a dollar value to an intangible—the value of life.

There exists a substantial body of empirical research on the value of a statistical life, grounded in well-established economic theory, published extensively in peer-reviewed journals, and accepted

⁵ In this case involving the wrongful death of a young male in his 20s the jury awarded \$2.5 million for loss of enjoyment of life.

⁶ In this bench trial the federal judge awarded \$1.0 million for loss of enjoyment of life in this personal injury case.

⁷ 954 F. Supp. 230 (D.C. NM, 1996).

⁸ 214 F.3d 1235 C.A. 10 (N.M.), 2000.

⁹ CIV 97-1418 MV/RLP, Memorandum Opinion and Order, July 30, 1999.

¹⁰ This present value calculation of a hypothetical annual dollar per year over the plaintiff's life expectancy has no connection to the value of life studies discussed previously, and is a separate, distinct, and alternative guideline to the trier of fact in the trier of fact's own determination of loss of enjoyment of life damages.

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by mainstream economists. Economic research on the value of life demonstrates that workers and consumers implicitly place a finite value on life, when making certain economic decisions. Economic studies of the value of life are based upon actual market transactions of workers and consumers, providing an objective pecuniary measurement of the intangible value of life.

For many years the results of economic research on the value of life have been accepted by the federal government and widely applied in cost/benefit analysis of federal environmental or safety regulations. The cost to implement these regulations can usually be quantitatively estimated, while the benefits generally fall in the category of "lives saved." A value of life estimate is needed in order to quantify the benefits of these regulations.¹¹ The New Mexico State Highway and Transportation Department, relying upon value of life studies, recommends the use of a \$2.6 million value of life (in 1994 dollars) in its cost/benefit analysis of traffic safety improvements, where the benefit is lives saved¹². More recently, the federal Environmental Protection Agency used \$6.1 million for the value for each life that would be saved by its proposed arsenic standards for drinking water¹³. And the U.S. Department of Transportation (DOT) recommends the use of a value of life of \$3.0 million in all DOT analyses (2001 dollars).¹⁴

Economic research on the value of a statistical life provides a reliable methodology to determine the value which our society places on a whole life. This research is most applicable to a wrongful death case, where there has been the total loss of the enjoyment of life. However, in a personal injury case, where there has been a partial loss of enjoyment of life, the valuation of a statistical, whole life can be used by the jury or trier of fact as a benchmark for a total loss of enjoyment of life, and then a percentage factor can be applied to this benchmark based upon the jury's judgment about what percentage of the total enjoyment of life has been lost by the plaintiff.

The issue at hand is whether the economic research on the value of life is reliable and relevant so that it can assist the trier of fact to understand the evidence before it or to determine a fact in issue. The quantification of damages for loss of enjoyment of life is a fact issue in a tort action where permanent injury has resulted. Daubert¹⁵ has set forth four factors for the acceptance of testimony by an expert: (1) the underlying theory and science can be and has been tested; (2) it has been subject to peer review; (3) it has a known or potential rate of error; (4) it is generally accepted by the scientific community. More recently, Kumho¹⁶ held that the application of the Daubert factors is flexible and critically dependent upon the particular circumstances of the case at hand, including the expert's particular expertise and the subject of his testimony.

Economics is a social science, and not a physical science. It deals with human behavior and is not amenable to the same standard of testing as can occur in a physical science discipline. Economists cannot generally conduct controlled experiments of human behavior, but rather must be content with analyzing and evaluating observable economic behavior and data. Econometric

¹¹ See, for example, "The Value of Life: Estimates With Risks By Occupation and Industry," W. Kip Viscusi, Economic Inquiry, 42 (1), January 2004, p. 29.

¹² "Traffic Accident Costs For Highway Safety Analyses in New Mexico," J. Hall, October, 1995.

¹³ "Saving Statistical Lives," Sebastian Mallaby, Washington Post, March 5, 2001, page A19.

¹⁴ Memorandum, Revised Departmental Guidance, Treatment of Value of Life and Injuries in Preparing Economic Evaluations, Kirk K. Van Tine, general counsel, et. al., U. S. Department of Transportation, January 29, 2002.

¹⁵ Daubert v. Merrell Dow Pharmaceuticals, Inc. 509 U.S. 579 (1993).

¹⁶ Kumho Tire Co. v. Patrick Carmichael, 526 U.S. 137, 141 (1999).

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techniques are used to test economic theories. In the case of some value of life studies, the underlying theory is that workers require a higher wage or risk premium to accept employment in an industry or occupation, which has a greater probability of death from work-related conditions. The econometric methods test the validity of this theory by the use of t-statistics, F tests, and correlation coefficients. Studies reported in the economic literature report statistical tests which state with a reasonable degree of probability that indeed workers do require the payment of a risk premium to accept employment in a more risky occupation. These are the same statistical tests used to measure the parameters of a demand curve, for example, and to state with a reasonable degree of probability what the price elasticity of demand is in an anti-trust case.

However, another aspect of the testing of an economic theory is research replication. If not one, but many studies of the value of life find similar research results, then the economics profession can be more confident in the validity and reliability of the theory. W. Kip Viscusi, who is one of the most well known economic researchers in the area of value of life and who is now on the faculty of the Harvard Law School, wrote a survey of the literature review article, published in 1993, for the American Economic Association's Journal of Economic Literature¹⁷. Viscusi reviewed 24 studies of the value of life, which analyzed the decisions of workers to accept employment in riskier occupations. A thorough review of the economics literature on the value of life was commissioned by the U.S. Environmental Protection Agency in June, 1983 with an update in March, 1989¹⁸. Ted R. Miller reviewed 67 studies of the value of life in a 1990 article published in the Journal of Forensic Economics¹⁹. And more recently in 2003, Viscusi and Aldy reviewed more than 60 studies of the value of life from 10 different countries.²⁰ These surveys of the economic literature on the value of a statistical life document the volume of research replication in this area of economic inquiry.

Economic studies of the value of life have been subject to extensive peer review. Individual research studies have been published in the top peer-reviewed economic journals including the Journal of Political Economy, Review of Economics and Statistics, Economic Inquiry, Quarterly Journal of Economics, and American Economic Review.

The factor of a known or potential rate of error for value of life studies can be addressed in two ways. First of all, an individual study of the value of life, which relies upon econometric regression analysis, estimates as part of the analysis standard deviations of regression coefficients. These standard deviations are used in the t-statistics test to accept or reject the research hypothesis at a certain level of statistical confidence. These standard deviations are also used to establish a 95% confidence interval around the estimate of the value of life. In a 2003 study Aldy and Viscusi summarized their labor market wage-risk analysis as follows: "Evaluated

¹⁷ "The Value of Risks to Life and Health," W. Kip Viscusi, Journal of Economic Literature, Vol. XXXI (December, 1993), pp. 1912-1946.

¹⁸ "Valuing Reductions in Risks: A Review of the Empirical Estimates," Daniel M. Violette and Lauraine G. Chestnut, June, 1983 and "Valuing Risks: New Information on the Willingness to Pay for Changes in Fatal Risks," Daniel M. Violette and Lauraine G. Chestnut, March, 1989, reprinted in Hedonic Damages Proving Damages for Lost Enjoyment of Living, Richard A. Palfin and Brent B. Danninger, The Michie Company, 1990.

¹⁹ "The Plausible Range for the Value of Life—Red Herrings Among the Mackerel," Ted R. Miller, Journal of Forensic Economics, Fall, 1990.

²⁰ "The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World," W. Kip Viscusi and Joseph E. Aldy, Journal of Risk and Uncertainty, 27 (1), 2003, pp. 5-76.

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at the sample mean wage, the coefficient on the mortality risk variable implies a sample mean value of a statistical life of \$4.23 million (1996 dollars), with a 95 percent confidence interval of \$3.20 to \$5.28 million.²¹

Secondly, the survey literature cited above reports ranges of value of a statistical life based upon an analysis of various different studies. Viscusi²² reports that among the majority of the 24 wage/risk studies reviewed the value of life ranged from \$3.0 million to \$7.0 million in 1990 dollars. Ted Miller²³ calculated a \$2.2 million average value of life based on 47 studies in 1988 dollars. Miller also reported that the standard deviation about this \$2.2 million average was \$0.65 million. Viscusi and Aldy²⁴ report a value of a statistical life which ranges from \$5 million to \$12 million for the more reliable labor market studies published in the U.S. with a median estimate of \$7 million in 2000 year dollars.

Finally, there is the issue of the general acceptance of the theory by the scientific community. As evidence of the general acceptance of the value of life theory within the economics profession, I would note that the American Economic Association in its classification system for journal articles includes a unique and separate classification (J17) for "Value of Life; Foregone Income" studies, listed under the general classification of Labor and Demographic Economics (J)²⁵. Kenneth Arrow, a Nobel laureate economist, in 1997 wrote that ... "the study of this relation (the increased risk of death for a price) has become, indeed, a standard way of estimating the value of life for use in benefit-cost analysis."²⁶ In his survey of the value of life literature in December, 1993 Viscusi recognized then the long research tradition of value of life. "Although the value of life literature is now roughly two decades old, the essential approach became well established in the 1970s."²⁷ More recently, Viscusi stated the general acceptance of the value of statistical life research this way:

Economic values of a statistical life are now part of generally accepted economic methodology. The theoretical foundations dating back to Adam Smith's theory of compensating differentials are widely accepted. For roughly a quarter century, economists have developed empirical estimates of the trade-off between wages and fatality risks, which continue to dominate the value of life literature.²⁸

In a 1990 article²⁹ published in the Journal of Forensic Economics Viscusi explores the legal or public policy rationale for the award of value of life damages in tort actions involving permanent

²¹ "Age Variations in Workers' Value of Statistical Life," Joseph E. Aldy and W. Kip Viscusi, National Bureau of Economic Research, Working Paper 10199, Cambridge, MA, December 2003.

²² Viscusi, *op. cit.*, p. 1930.

²³ Ted Miller, *op. cit.*

²⁴ Viscusi and Aldy, *op. cit.*, p. 18.

²⁵ See, for example, Journal of Economic Literature, American Economic Association, (June, 1997), Vol. XXXV, No. 2, p. 1002.

²⁶ "Invaluable Goods," Kenneth Arrow, Journal of Economic Literature, Vol. XXXV, No. 2, 1997, p. 759.

²⁷ W. Kip Viscusi, *op. cit.*, p. 1942.

²⁸ "The Value of Life: Estimates With Risks By Occupation and Industry," W. Kip Viscusi, Economic Inquiry, 42 (1), January 2004, p. 29.

²⁹ "The Value of Life: Has Voodoo Economics Come to the Courts," W. Kip Viscusi, Journal of Forensic Economics, Vol. 3, No. 3, 1990, pp. 1-15.

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injury. He discusses the concept of damages as compensation versus deterrence³⁰, and favors value of life damages for their deterrence value in product liability cases. In this article Viscusi notes that the valuation of life technique is "well established in the economics literature...and ...the main issue is not how we go about calculating these values....there is a well established methodology for doing so." Viscusi concludes by saying that "juries currently have no guidelines for setting the damages needed to establish safety incentives (deterrence values), and the value of life methodology establishes this basis." The purpose of my testimony in the area of the value of life/loss of enjoyment of life would be to provide these guidelines to the trier of fact.

Economists have generally employed two types of studies to determine the value of life. One relies upon an analysis of wage differentials for jobs with different inherent hazards. The economic theory is that workers demand a higher wage to accept employment in an occupation with a greater probability of death from a work-related accident. This wage differential, or risk premium, is estimated using multivariate statistical techniques, and this analysis is then used to estimate how workers implicitly value a statistical life.

The second type of value of life study is referred to as "willingness to pay" research. Consumer behavior in the actual purchase of life-saving devices, e.g., smoke detectors, seat belts, and airbags, is analyzed to determine how much the consumer is willing to pay to reduce the probability of death. Where the wage/risk studies measure the wage premium to accept a greater probability of death, the consumer willingness to pay studies measure the amount consumers are willing to pay to reduce the probability of death³¹.

The results of value of life studies over the last 30 years have had a wide range of valuations. The most recently published research on the value of life is now based upon larger sample sizes and has developed better data sets such as both occupation and industry fatality risk variables, age-specific fatality risk data rather than average-age fatality risk data, data on nonfatal injuries, and data on expected workers compensation benefits. These improved data sets have helped to explain away some of the wide variation in past studies and have narrowed the range of value of life estimates. Viscusi notes: "What these results suggest is that the lack of robustness of evidence of compensating (wage) differentials for job risks may have stemmed in part from deficiencies in the job risk measure rather than underlying shortcomings of the economic theory."³²

Viscusi's value of life study, published in 2004, is based upon a sample of 99,033 workers and uses these improved data sets. Viscusi finds the value of a statistical life for his full sample equal to \$4.7 million in 1997 dollars, which would be \$6.02 million in 2004 dollars.³³ Aldy and

³⁰ Romero v. Byers held that value of life itself is compensable under the New Mexico Wrongful Death Act. And the purpose of the Wrongful Death Act is to compensate the statutory beneficiaries and to deter negligent conduct. See Stang v. Hertz Corporation, 81 NM at 72 463 P.2d at 58 (1969).

³¹ There are also value of life studies referred to as contingent valuation studies where individuals are surveyed about their preferences to accept risk in exchange for monetary values. Contingent valuation studies are not based upon actual market transactions, unlike the wage/risk and consumer willingness to pay studies. Thus, the contingent valuation studies are considered less reliable and less objective.

³² "The Value of Life: Estimates With Risks By Occupation and Industry," W. Kip Viscusi, Economic Inquiry, 42 (1) January 2004, p. 47.

³³ Ibid., p. 39, Table 3.

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Viscusi's value of life study, published in 2003, is based upon a sample of 116,632 workers using age-dependent fatal and non-fatal risk variables. Their results support a mean value of a statistical life of \$4.23 million in 1996 dollars,³⁴ or \$5.63 million in 2004 dollars. Viscusi and Aldy's 2003 survey of the economics literature found that half of the studies of U.S. compensating wage differentials reveal a value of a statistical life ranging from \$5 million to \$12 million, with a median value of \$7 million.³⁵ Thus, a reasonable estimate of the value of a statistical life today in the U.S. is \$5-6 million.

As further evidence of the reliability of the valuation of life studies, Ted Miller reported separately the average value of life from the wage/risk studies and from the consumer willingness to pay studies. The average value of life was essentially the same from two distinctly different research approaches to the valuation of life. Viscusi and Aldy found a similar result in their survey of the economic research on the value of life: "The (willingness to pay) studies in general find an implicit value of a statistical life on the same order of magnitude as the labor market studies, although they tend to be a little lower."³⁶

The use of averages is constantly employed by economists and accepted by the courts, e.g., average earnings of a high school graduate, average work life, and average life expectancy. A great deal of variation exists in all kinds of economic data including the income of persons in the U.S., which can range from \$0 to several million dollars. Averages are used by economists as evidence of probabilities, not speculation. The observed variation in the value of a statistical life from different economic studies in the past can be traced to differences in the quality of the data sets, the completeness of the empirical specification, and differences in the risk preferences, income level, age, and gender of the sample of workers analyzed. Just as we should not expect every individual to place the same dollar value on his or her life, the variation in the value of a statistical life from different studies should not be used to question the reliability of this research.

Some economists argue that it is impossible to assign a dollar value to life because the value of life is infinite. Ireland and Gilbert³⁷ note that this conclusion is in error and arises from the faulty assumption that a value must be infinite if a monetary equivalent value does not exist. They note market and non-market evidence that individuals do take risks of losing their own lives when something of sufficient value is at stake, e.g., saving the life of a child trapped in a burning building or a terminally ill patient foregoing extraordinary life support measures to conserve family assets and the economic security of surviving family members.

Individuals make everyday choices to put their lives at some small risk in employment and consumption decisions. "Logically, if some one knowingly takes even the slightest risk of being killed when the risk can be avoided at a finite cost, that person is acting as if the total value of that person's life must be finite."³⁸

³⁴ "Age Variations in Workers' Value of Statistical Life," Joseph E. Aldy and W. Kip Viscusi, National Bureau of Economic Research, Working Paper 10199, Cambridge, MA, December 2003, p. 15.

³⁵ "The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World," W. Kip Viscusi and Joseph E. Aldy, *Journal of Risk and Uncertainty*, 27 (1), 2003, pp. 5-76.

³⁶ Viscusi and Aldy, *Ibid.*, p. 24.

³⁷ "Supramonetary Values, The Value of Life, And the Utility Theory Meanings of Tort Recovery," Thomas R. Ireland and Roy Gilbert, *Journal of Forensic Economics*, Volume 11, No. 3, 1998, pp. 189-201.

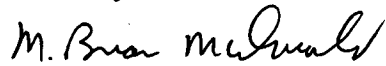
³⁸ *Ibid.*, p. 192.

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In the end, the economic research on the value of a statistical life may be used by the jury, or other fact finder in this case, as a guideline. This economic research is for a statistical, average life. An individual may value his/her life more or less depending upon such factors as age, gender, income and/or attitudes toward risk taking. Given a choice, no rational person will place a finite value on his or her life. However, this does not mean that the economic research on the value of life is not useful. This research examines the actual market behavior of workers or consumers in decisions regarding the choice of an occupation or the purchase of risk-reducing products, and infers from this behavior how workers and consumers are implicitly valuing a statistical, average life.

Please call me if you have any further questions.

Sincerely,

A handwritten signature in cursive script, appearing to read "M. Brian McDonald".

M. Brian McDonald, Ph.D.